U.S. Department of Transportation
United States Coast Guard

Commandant
United States Coast Guard

2100 Second Street, S.W.
Washington, DC 20593-0001
Staff Symbol: G-SLP
Phone: (202) 267-6619

COMDTINST M4130.8
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COMMANDANT INSTRUCTION M4130.8

Subj: **COAST GUARD CONFIGURATION MANAGEMENT FOR ACQUISITIONS AND MAJOR MODIFICATIONS**

Ref:
(a) Coast Guard Configuration Management, COMDTINST 4130.6
(b) Systems Acquisition Manual, COMDTINST M4150.2 (Series)
(c) Acquisition And Management Of Integrated Logistic Support (ILS) For Coast Guard Systems And Equipment, COMDTINST 4105.2
(d) Coast Guard Engineering Logistics Concept Of Operations (ECONOP), COMDTINST 4100.7
(e) Specification Development Guide, COMDTINST M4121.5
(f) Work Breakdown Structure, MIL-STD-881A
(g) Quality Assurance Terms And Definitions, MIL-STD-109
(h) Configuration Management, MIL-STD-973
(i) Notice 1, Technical Reviews And Audits For Systems, Equipment, And Computer Software, MIL-STD 1521B

1. **PURPOSE**. This instruction is a follow-on to reference (a), which is the basis for all Coast Guard Configuration Management (CM) policies and procedures. It establishes specific requirements and guidelines for implementing CM during the acquisition phase of a Configuration Item (CI). This instruction is applicable to all acquisition projects including major modification projects or enhancements to existing operational assets for which at least one hardware, software or firmware item has been identified as a CI per direction provided in reference (a).

2. **ACTION**. Area and district commanders, commanders of maintenance and logistics commands, commanding officers of headquarters units, assistant commandants for directorates, Chief Counsel, and special staff offices at Headquarters and all personnel associated with acquisition projects, including interrelated management or support disciplines shall:

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A	1	1	1		1	1	1	1	1	1		1	1	1	1	1	1	1	1		1					
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NON-STANDARD DISTRIBUTION:

a. Use this instruction and the listed references for guidance on implementing CM during acquisition in a cost efficient manner, and

b. Tailor the application of CM, including Configuration Identification, Configuration Control, Configuration Status Accounting (CSA) and Configuration Audits, to the requirements and restrictions associated with their specific project or assigned area of responsibility.

3. **DIRECTIVES AFFECTED**. This instruction expands on and assigns specific responsibilities for the CM requirements stated in references (a) through (d).

4. **BACKGROUND**. The Coast Guard has long recognized an increasing need for CM as a necessary engineering management tool. As a result, several Coast Guard instructions have been promulgated to address specific aspects of CM:

a. Reference (a) establishes the framework for CM policy in the Coast Guard by defining key CM concepts.

b. Reference (b) requires that CM planning and use be applied to all Level I, IIIA and IV major acquisition.

c. Reference (c) defines the ILS elements, which influence the selection of CIs.

d. Reference (d) is an important logistics-planning document that establishes principles for the future Coast Guard logistics system and CM.

e. This instruction builds on references (a) through (d) by addressing the use of CM during acquisition and major modification projects.

5. **POLICY**. Per reference (a), a CI is defined as an aggregation of hardware, software or both; or any of its discrete portions, which satisfies an end-use function, and is either maintenance worthy, or engineering/logistics critical, and is designated for CM. Examples of a CI include a vessel, generator, software program, radar system, training equipment or test meter.

a. The CI selection process shall be guided by and in compliance with the Coast Guard definition of a CI.

(1) For major acquisitions, the CI selection process shall reflect the mission, operational and performance requirements as set forth in the Mission Need

Statement (MNS), the Operational Requirements Document (ORD), and all other applicable project and Requirements documents. All CI requirements must be traceable back to the MNS and the ORD.

(2) For non-major acquisitions, the CI selection process shall reflect the mission, operational and performance requirements as set in specific project and requirements documents.

(3) For major modification projects or enhancements of the operational assets the CI selection process shall reflect proposed change(s) to the mission of the operational asset, as set in specific operational and performance requirements documents.

b. Every CI, designated for CM shall have:

(1) Associated configuration documentation (i.e., a configuration baseline and all Coast Guard approved changes to the baseline). This documentation shall describe the functional, performance and physical characteristics of the ORD.

(2) Configuration changes to the CI, down to the Lowest or Line Replaceable Unit (LRU) within the CI, controlled through a structured change control process.

(3) An automated CSA system having a data base containing information on the CI. This includes the contractor's CSA data base which must contain data elements compatible with the Coast Guard selected data elements.

(4) Configuration audits conducted to verify that configuration documentation accurately describes the configuration of the CI.

6. **SCOPE**. CM policy and procedures, as established by this instruction, are applicable to:

a. All Level I, IIIA and IV major acquisition projects.

b. All non-major acquisition projects for which G-SL has determined CM to be a project requirement.

c. All major modification projects or enhancements for existing operational assets where a Project Officer (PO) is designated by the Chief of Staff. Examples of a major modification project or enhancement include Major Maintenance Availability (MMA), Fleet Renovation and Modernization (FRAM) and Service Life Extension Program (SLEP).

7. **PROCEDURES**. All Coast Guard personnel involved in or associated with acquisition projects and major modification projects, including all project matrix organizations, shall refer to this COMDTINST for guidance, descriptions and definitions relevant to implementing CM. Information provided in these chapters shall be used as the foundation for establishing and implementing CM within acquisition projects. In this instruction, "System" or "System CI" refers to the highest level CI, (i.e., the System or System CI is not part of another CI) being acquired under an acquisition project. A System or System CI may be a platform, vessel, aircraft, air station, or shore facility. A system (e.g., radar system or command, control and communications system), subsystem or equipment (e.g., an engine) may also be a System or System CI when the system, subsystem or equipment is the highest level CI being acquired.

L. F. BOSMA, CAPT
Director of Logistics

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CHAPTER 1

RESPONSIBILITIES FOR IMPLEMENTING COAST GUARD CONFIGURATION MANAGEMENT POLICY FOR ACQUISITION PROJECTS AND MAJOR MODIFICATIONS

A. Commandant (G-SLP) is responsible for developing and promulgating CM policy and standardizing CM plans, procedures and application throughout the Coast Guard. G-SL also determines, on a case by case basis, whether CM is required for non-major procurement projects. G-SLP also is responsible for participating in all Functional Configuration Audits (FCAs) and Physical Configuration Audits (PCAs).

B. Commandant (G-A) is responsible for ensuring that the degree of CM applied to all acquisition projects is appropriately tailored to the complexity, size, quantity, intended use, mission criticality and performance requirements of the project.

C. Commandant (G-A-2) is responsible for providing assistance to Project Managers (PMs) and when requested or required, to Project Officers (POs) with respect to tailoring the requirements and guidelines set forth in this instruction to individual project requirements.

D. Commandant (G-O, G-M and G-S) Operational Managers, Facility Managers and System Managers shall be involved as early as possible with project CM activities to facilitate the transition from acquisition project to operational programs.

E. Project Managers for major acquisition projects are responsible for approval of and the overall conduct of CM and technical data management for assigned major acquisition projects. The PM's responsibilities include:

1. Ensuring that the Project Configuration Control Board (CCB) is chartered per reference (b), and uses an established and well-defined change control process following the guidelines in Chapter 5 of this instruction. The PM acts as chairperson for the CCB.

2. Overseeing the preparation of the Project Configuration Management Plan (CMP) once system requirements have been defined, but prior to actual design selection; and providing an approved CMP prior to system development.

3. Ensuring that CM concerns and considerations are addressed in, and incorporated into other project activities and documentation as appropriate.

4. Ensuring that CM issues and actions are communicated to the project matrix organizations and contractor CM organization(s).

5. As required, coordinating the Project CCB with other internal and external Coast Guard CCBs, such as those established for aircraft, vessels, communications or for Department of Defense (DOD) managed equipment.

F. Project Officers (POs) and Project Sponsors (PSs) for non-major procurement projects are responsible for implementing CM in non-major acquisition projects. POs and PSs shall use the CM requirements stated in this manual as the minimum acceptable CM effort. POs and PSs are responsible for determining the extent to which CM is required for, and applied to their specific projects. POs and PSs may use reference (b) for guidance in tailoring the application of CM. The PO's/PS's responsibilities include:

1. Overseeing the preparation of the Project Configuration Management Plan (CMP) once system requirements have been defined, but prior to actual design selection; and providing an approved CMP prior to system development.

2. Ensuring that the Project Configuration Control Board (CCB) uses an established and well-defined change control process following the guidelines in Chapter 5. The PO acts as chairperson for the CCB.

3. Ensuring that CM concerns and considerations are addressed in, and incorporated into other project activities and documentation as appropriate.

4. Ensuring that CM issues and actions are communicated to the project matrix organizations and contractor CM organization(s).

5. As required, coordinating the Project CCB with other internal and external Coast Guard CCBs, such as those established for aircraft, vessels, communications or for Department of Defense (DOD) managed equipment.

G. Project Officers for major modification projects are responsible for approval of and the overall conduct of CM and technical data management for assigned modification projects. The PO's responsibilities include:

1. Ensuring that the Project Configuration Control Board (CCB) uses an established and well-defined change control process following the guidelines in Chapter 5. The PO acts as chairperson for the CCB.

2. Overseeing the preparation of the Project Configuration Management Plan (CMP) once system requirements have been defined, but prior to actual design selection; and providing an approved CMP prior to system development.

3. Ensuring that CM concerns and considerations are addressed in, and incorporated into other modification

project activities and documentation as appropriate.

4. Ensuring that CM issues and actions are communicated to the project matrix organizations and contractor CM organization(s).

5. As required, coordinating the Project CCB with other internal and external Coast Guard CCBs, such as those established for aircraft, vessels, communications or for Department of Defense (DOD) managed equipment.

H. Deputy Project Managers/Officers, in the event of the PM's/PO's absence, are responsible for assuming the PM's/PO's responsibilities for CM.

I. Project CM Managers (Project CMan) are responsible for coordinating the day-to-day CM activities associated with their assigned acquisition projects. Specific responsibilities of the Project CMan include:

1. Preparing, writing and as necessary updating the Project CMP.

2. Recording and coordinating all CM meetings and actions, and acting as the status control point for all configuration change proposals.

3. Receiving all configuration change proposals, distributing proposals to CCB members, and consolidating comments and recommendations for the CCB Chairperson.

4. Preparing and distributing CCB meeting agenda, date, time and place to all CCB members.

5. Establishing and maintaining all configuration control procedures, history, and process information for each proposal.

6. Maintaining a tracking system or log on CCB activities.

7. Establishing and maintaining a CSA system inclusive of all CIs comprising the project.

8. Attending and participating in project configuration audits, configuration reviews and technical reviews.

J. CCB members are responsible for reviewing, providing comments and recommendations on all configuration change proposals that will modify a CI's functional, operational or physical characteristics. When necessary, refer to higher authority for problem resolution or guidance.

K. Contracting Officers and/or the Contracting Officer's Technical Representative is responsible for enforcing contractor compliance to all contractual CM requirements.

CHAPTER 2

CONFIGURATION MANAGEMENT DURING ACQUISITION

A. **Introduction.** Once initiated, CM activities should continue throughout the life cycle of a product including the sustainment and disposition phases. Figure (1) depicts CM activities during acquisition.

B. **Concept Exploration - Definition of Conceptual Design.** Early in the acquisition life cycle phase, project requirements are defined and alternative approaches are explored. Project requirements reflect the need for a new System, the intended mission of the new System, and the System or draft System level requirements, i.e., the operational and functional requirements of the System. These requirements are stated in project documents, e.g., the Mission Needs Statement (MNS), Project Management Plan (PMP), Integrated Logistics Support Plan (ILSP), Electronics Integrated Logistics Support Plan (EILSP) and all other project baseline documents. Implementing CM early in the acquisition life cycle phase ensures organized control and traceability of project documents and System requirements.

C. **Demonstration and Validation - Design Selection, Preliminary Design.** After the overall System requirements are defined, the basic characteristics of the System are refined and documented as a Functional Baseline (FBL) and Functional Configuration Documentation (FCD). CM personnel involvement in this process includes:

1. Assisting the Project Office establish the FBL, i.e., baselining the System/System segment specifications (and updating the FBL as required).

2. Placing the FBL under configuration control.

3. Establishing configuration control procedures for processing and implementing approved configuration change proposals to the FBL.

4. Establishing a CSA system with a database capable of tracking any activities relating to the System/System segment specifications (i.e., the FBL).

5. Assisting in the conduct of System Requirement Reviews (SRRs).

6. Assisting in the development of draft Hardware Configuration Item (HWCI) and Computer Software Configuration Item (CSCI) specifications.

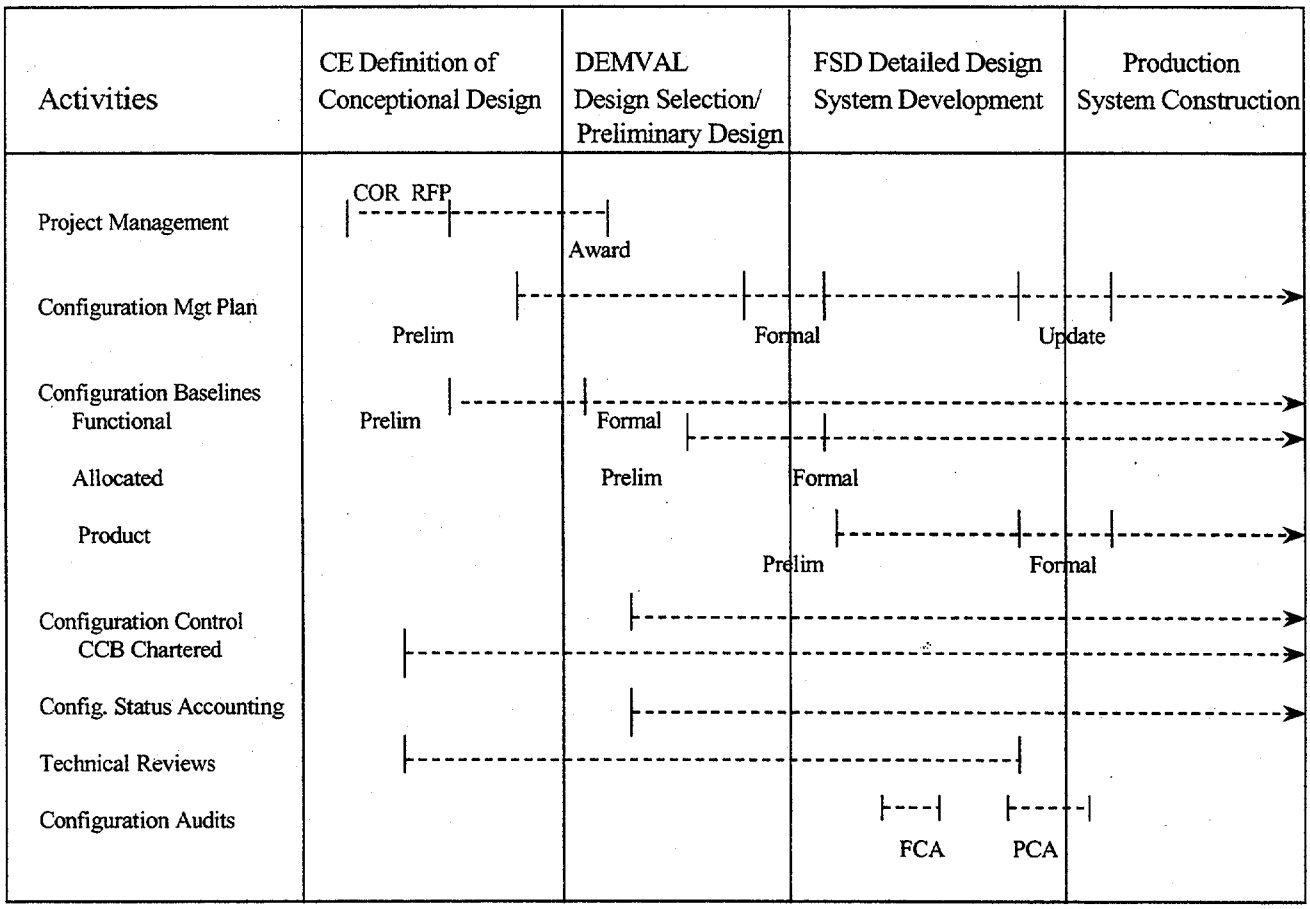

Figure 1, Configuration Management During Acquisition

7. Assisting project engineer(s) in conducting System Design Review(s) (SDRs) for HWCIs, and Software Specification Review(s) (SSRs) for CSCIs.

8. Drafting the project CMP. This includes developing, coordinating the review and approval of, and updating the CMP as required.

9. Reviewing CM processes and related documents. Documents reviewed include project management documents. The contractor's CMP is also reviewed when a contract has been invoked and a contractor CMP deliverable/CDRL is included in the contract.

D. **Full-scale Development - Detailed Design, System Development.** Next, CIs are designed, built, tested, and integrated into a complete System based on the technical documentation describing the configuration characteristics of CIs. This documentation includes PM/PO approved development or requirements specifications for individual CIs, and draft product specifications for all CIs comprising the System. CM is required for prototype development at this time. If prototype CIs are produced, the PM/PO should monitor the contractor's CSA system for tracking the configuration of the prototype to assure that the CSA data base accurately reflects the Coast Guard approved detail design requirements. CM tasks in support of these efforts may include:

1. Revising the project CMP.

2. Updating the FBL.

3. Establishing and updating the Allocated Baseline (ABL) and Allocated Configuration Documentation (ACD).

4. Continuing CSA for the FBL, and starting CSA for those CIs having Coast Guard approved ABLs.

5. Expanding the configuration control process established to control changes to the FCD, to control proposed configuration changes to the ACD.

6. Participating in the Preliminary Design Review (PDR) and Critical Design Review (CDR).

7. Coordinating the project matrix review of proposed modifications to the contractor's CM documents, e.g., the contractor's CMP. Normally, these documents are submitted prior to establishment of the FBL.

8. Assisting in the review of the product specifications. If approved by the Coast Guard, the Product Baseline (PBL) is established.

9. Assisting in the conduct of the Functional Configuration Audit (FCA) for each CI.

10. Assisting in the conduct of the Physical Configuration Audit (PCA) for each CI.

11. Assisting in the approval of the PBL upon successful completion of the PCA.

E. **Production - System Construction**. CM continues to grow in importance once the PBL is established. Mass production of the System relies on the accuracy of the current Product Configuration Documentation (PCD). During production, the PM/PO should continuously audit, control changes to, and maintain a CSA system for all baselines and associated configuration documentation. The Operational, Facility or System Manager should prepare to accept responsibility for, and have procedures in place to accept the contractor's and Project Office's CSA databases. The Operational/Facility/System Manager's office should have the capability to trace the current configuration identification numbers, the status of all changes, and all PM/PO approved configurations and associated configuration documentation for each CI. CM tasks during production include:

1. If not yet completed, conducting the FCA and PCA, and establish the PBL and PCD for each CI.

2. Expanding the configuration control process established to control changes to the FCD and ACD, to also control proposed changes to the PCD.

3. Preparing for and beginning to transition configuration control and the CSA database from contractor and the PM's/PO's control and maintenance to the Operational, Facility or System Manager.

CHAPTER 3

IMPLEMENTING CONFIGURATION MANAGEMENT IN THE CONTRACT

A. **Introduction**. The contract is the primary vehicle used by the PM/PO to direct a contractor to use CM for developing a CI and its supporting data. The PM/PO, with the assistance of the Project CMan, is responsible for developing the contract CM requirements and under the overall surveillance of the contracting officer, monitors the contractor's performance.

B. **Contracting for Configuration Management**. There are three portions of a contract in which CM shall be addressed. These portions are: the Statement of Work (SOW), the Contract Data Requirements List (CDRL) and the Data Item Description (DID). All CM work to be performed under the contract must be identified by the PM/PO in the SOW and CDRLs. The Contracting Officer or the Contracting Officer's Technical Representative is responsible for enforcing contractor compliance to contractual CM requirements. A DID is required when data related to CM is required as a contract deliverable.

1. **Statement Of Work (SOW)**. The SOW should include a separate section describing the specific CM tasks the contractor will be required to perform, e.g., development of a CMP, CI establishment, baseline establishment (and timeframe, particularly for the PBL), CSA requirements, configuration control, etc. The detail to which the contractor's CM requirements are described should be tailored to the needs of the individual project. Refer to references (e) and (h) for guidance on addressing CM in the SOW.

2. **Contract Data Requirements List (CDRL)**. The CDRL (DD Form 1423) is used to describe the format, content, delivery schedule, and distribution of all data to be delivered by the contractor. This includes the contractor's CMP, CI selection process and recommendation, interface control, specifications, CSA system, audit plans, and contractor processing of configuration change proposals. Refer to reference (e) for guidance on developing and using CDRLs.

3. **Data Item Description (DID)**. A DID must be listed, as applicable, on a CDRL when the SOW tasks the contractor to provide information. Refer to reference (e) for guidance on using DIDs. A DID is required when any of the following CM data is required under the contract:

a. Contractor's CM Plan
b. CI Documentation Recommendations
c. Engineering Release Records
d. Interface Control Drawing Documentation
e. Advance Change Study Notice
f. Engineering Change Proposal
g. Request For Deviation
h. Request For Waiver
i. Specification Change Notice
j. Notice Of Revision
k. Configuration Status Accounting Information
l. Installation Completion Notification
m. Configuration Audit Plan
n. Conference Agenda
o. Conference Minutes
p. Configuration Audit Summary Report.

C. **Specification**. Specifications are not required for CM tasking under a contract. Specifications are used to identify CIs and are controlled by CM personnel. CM personnel are involved in the cataloging, control and release of specifications. CM's first task in regards to specifications is to catalog each specification required by the contract SOW and its corresponding standard or DID. CM personnel should control and release the master copy of specifications through the configuration control process.

CHAPTER 4

CONFIGURATION MANAGEMENT PLANNING

A. **Introduction**. Early planning is essential for CM to be effective. CM planning provides the Coast Guard PM/PO and the contractor with tailored requirements essential for establishing and controlling the configuration of a CI.

B. **Purpose**. CM planning should be detailed in a Project CMP. The prime purpose of the CMP is to detail how an organization intends to implement CM on a specific project. The CMP should identify and explain the who, what, when, where, and why for each CM activity; and contain practical step-by-step procedures for conducting CM.

C. **Identification of Configuration Management Requirements**. PMs/POs should begin identifying CM project requirements and planning for CM activities as soon as possible after project initiation. The CMP should be developed when project requirements are defined and prior to design selection. The CMP should be updated prior to determination of the detailed design or actual System development, and again at the time of System production/construction. This ensures that the CMP accurately reflects any changing requirements.

D. **Requirements**. All CMPs shall be:

1. Tailored by the PM/PO to reflect only those CM requirements applicable to the specific project and acquisition phase.

2. Coordinated, maintained, and reviewed periodically for update.

3. Updated or revised, prior to transition of the project from acquisition to operational status. This update of the CMP should be started well in advance of the actual fielding of a CI. The PM/PO and operational, Facility or System Manager should update the CMP jointly. The updated CMP then becomes the boilerplate for the Sustainment Phase CMP.

E. **Types of CMPs**. There are two types of CMPs: the Coast Guard Acquisition Project CMP and the contractor's CMP.

1. **Coast Guard Acquisition Project CMP**. The Coast Guard Acquisition Project CMP shall outline how the PM/PO will conduct CM activities for the project during development. This CMP shall be developed in accordance with reference (b). This CMP must include, at a minimum the following information:

a. A short introduction or description of the purpose and context of the plan and the acquisition project that the plan covers.

b. A listing of applicable CM documents and project documents interrelated with CM.

c. The project CM organization and assigned responsibilities.

d. Relevant project and CM specific milestones.

e. The extent to which CM will be implemented (tailored), particularly configuration identification and configuration control, and the method(s) to be used.

f. Identify how Interface Control Documents (ICDs) will be processed and the use of Interface Control Working Groups (ICWGs).

g. How CM activities will be conducted during the in-service or sustainment life cycle phase of a CI.

2. **Contractor's CMP**. A contractor's CMP shall be required of any contractor tasked with performing CM. This requires that the CMP be identified in the SOW and a CDRL. A DID is required when a CMP is identified as a contract deliverable. The contractor's CMP should be submitted via the contracting officer to the PM/PO for approval prior to the contractor beginning any CM work. Guidelines for implementing a CMP under a contract are available in Appendix A of reference (h). The basic content of a contractor's CMP shall:

a. Describe the overall purpose and scope of the CMP.

b. Describe the contractor's CM organization.

c. Identify procedures for establishing configuration identification.

d. Define the contractor's configuration change control policies and procedures for processing changes.

e. Define the contractor's plans and procedures for establishing, maintaining and utilizing a CSA system.

f. Describe how the contractor will ensure subcontractor/vendor compliance with the CM requirements stated in the contract.

g. Identify how the contractor will process and control ICDs and the use of ICWGs.

h. Describe the who, how, when and where of the FCA and PCA.

i. Identify and define milestones for the CM activities, e.g., identifying CIs and establishing baselines, as related to project milestones.

3. **Software Configuration Management Planning**. When CSCIs are involved, the basic content of the project CMP and the contractor's CMP shall include or identify the following information:

a. The software CM organization and matrix. This organization may be part of the project CM personnel handling project hardware and software, or be a separate staff using separate facilities and resources.

b. Distinct software identification documents, such as software requirements specifications, software product specifications, software top level design documents, database design documents, and Version Description Documents (VDD), including version numbering schemes.

c. A distinct software change control process, including separate change control documents and the establishment of a Software Configuration Control Board (SCCB). NOTE: This applies to the contractor internal CM.

d. Specific procedures for the storage, marking, handling and release of software and related documentation.

e. Establishment and maintenance of software repositories, e.g., Software Development Libraries (SDLs) and Software Development Folders (SDFs).

f. How distinct CSA records and/or reports, such as a Computer Software Configuration Index will be used.

CHAPTER 5

CONFIGURATION MANAGEMENT ELEMENTS

A. **Introduction**. Formal implementation of CM is started at the time the FBL is established and continues through the sustainment and disposition life cycle phases of a CI.

B. **Configuration Identification**. Configuration identification leads to the release of approved CIs, their associated configuration baselines and configuration documentation.

1. **Configuration Baselines And Configuration Documentation**. Every CI must be baselined and have accompanying configuration documentation.

a. **Configuration Baseline**. A configuration baseline is comprised of documentation containing the aggregate technical description for a CI. The baseline must be formally approved by the Coast Guard. Once approved, any proposed changes to the baseline must be processed through the configuration control process.

b. **Configuration Documentation**. Configuration documentation refers to the technical documentation that identifies and defines a CI's functional and physical characteristics, and performance requirements. Configuration documentation includes all of the information required to provide a full technical description of a CI at the time the associated configuration baseline is established. Each CI has its own unique configuration documentation.

c. **Types of Baselines**. Typically, three baselines are established during acquisition. These baselines are the Functional Baseline, Allocated Baseline and the Product Baseline. These baselines continue to exist throughout the CI's service life through sustainment and disposal. Each baseline has an associated configuration documentation.

d. **Use of Baselines and Configuration Documentation**. Configuration baselines are used as "benchmarks." Using baselines ensures an orderly transition from one major commitment point to the next. Configuration documentation is as important as the physical product or CI. A CI is designed, produced, tested, operated, logistically supported, repaired and reprocured based on the configuration documentation. Configuration documentation is also used as a reference point for controlling changes to the approved configuration of a CI.

e. **Establishment of Baselines and Configuration Documentation**. Baselines are initially established by specifications in the contract. Each baseline is approved by the PM/PO upon successful completion of the appropriate technical reviews and configuration audits as the acquisition contract progresses from the determination of mission and design requirements through to production of a System. As a System evolves, the configuration documentation for the System, in particular for the lower level CIs becomes more detailed. Composition of the configuration documentation varies depending on the level of design development, the complexity of the System, and type of CI being described. Reference (e) contains guidance on selecting, developing and tailoring the use of specifications for configuration documentation.

(1) Early in the acquisition process, the FBL/FCD is used to establish performance oriented requirements. These requirements are intended to influence the design and development of the System. For large complex Systems, high level system CI requirements may also be established. This initial configuration documentation normally is comprised of management plans and System/system level specifications.

(2) As the System design matures, other documents, such as contractual requirements identifying detailed functional and performance specifications for subsystems are used. These requirements are then broken down into the functional and performance requirements for selected next lower level CIs. These requirements are identified in the ABL/ACD.

(3) Finally, the PBL/PCD is used to prescribe the "build to" or form, fit and function requirements, ILS requirements and the appropriate acceptance tests. The following become part of the configuration documentation once the design of the System is finalized to the point that production and later operations may be started:

(a) Detailed design drawings, parts listings.

(b) Operating manuals, maintenance procedures, and

(c) The Operational Logistics Support Plan (OLSP).

(4) Figure 2 depicts the timeframe for configuration audits and technical reviews which normally occur prior to baseline establishment. Figure 3 illustrates the development of the three configuration baselines. Figure 4 illustrates the development of configuration documentation. Paragraph E. of Chapter 5 discusses configuration audits that are required prior to establishing of the PBL. A description of the technical reviews mentioned in the paragraphs addressing the establishment of baselines is provided in Enclosure (1). Reference (i) provides a detailed description on the use of configuration audits and technical reviews.

f. **Precedence**. Documents in the PBL must be traceable to, and a detailed extension of the ABL. Documentation in the ABL must be traceable to, and a detailed extension of, the FBL.

(1) The FBL, ABL and PBL must be mutually consistent and compatible. If a conflict arises between the FBL, ABL, and the PBL, the order of precedence is:

(a) Functional Baseline/Functional Configuration Documentation.

(b) Allocated Baseline/Allocated Configuration Documentation.

(c) Product Baseline/Product Configuration Documentation.

(2) For major acquisition projects:

(a) The ORD takes precedence over the FBL.

(b) The MNS takes precedence over the ORD.

g. **Functional Baseline**. The FBL is the initially approved configuration baseline for a System. The FBL states the functional requirements for a System. The FBL is defined by the FCD, including any Coast Guard approved changes to the FCD.

(1) **Form**. The FBL is written in the form of a System Specification for a System or a System Segment Specification for a large System. For example, major acquisitions the MNS and ORD are reflected in the System Specification, and therefore are part of the FBL. The FBL for a single item project (e.g., an engine) is written as a Prime Item Specification.

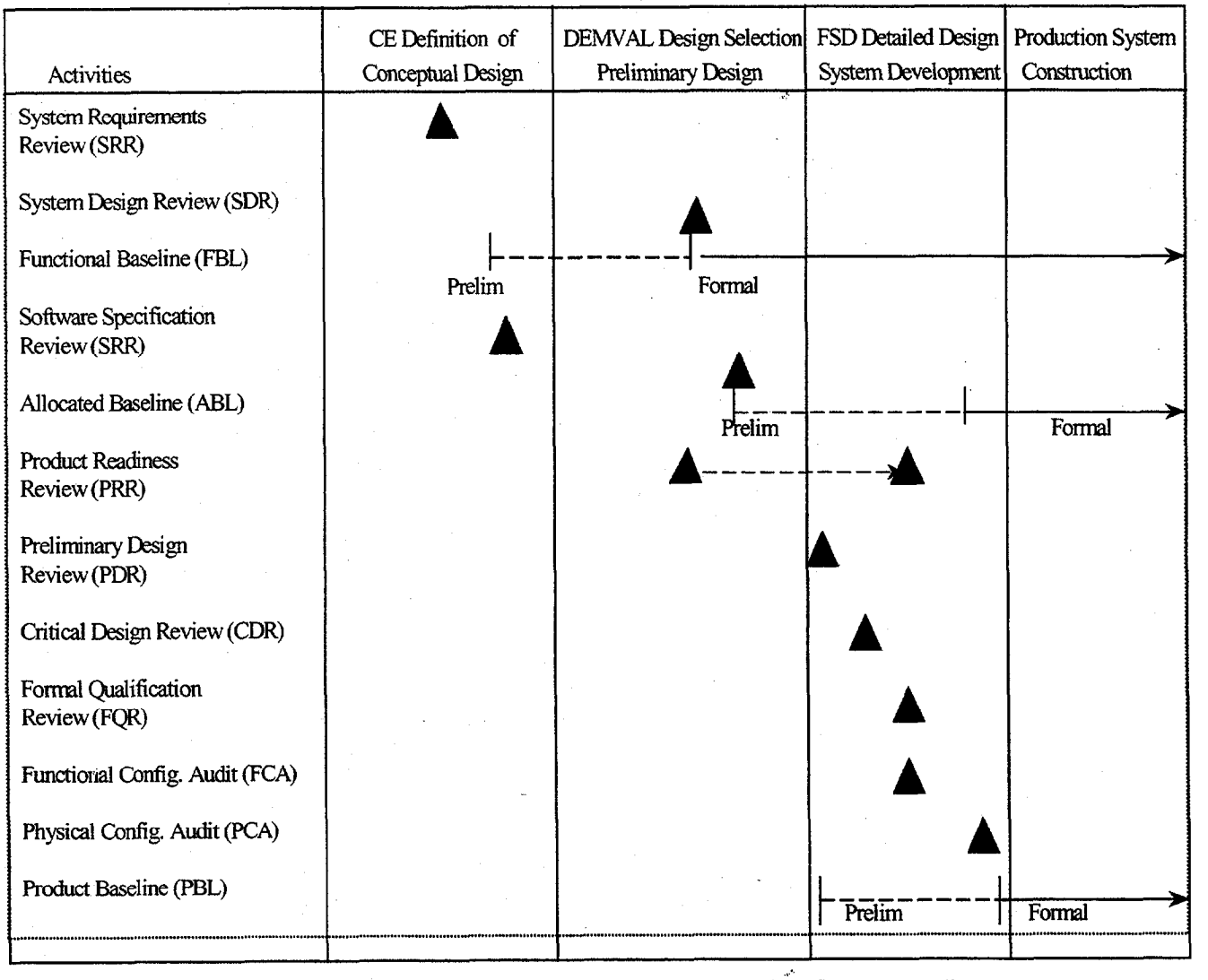

Figure 2, Configuration Audits, Technical Reviews and Configuration Baselines

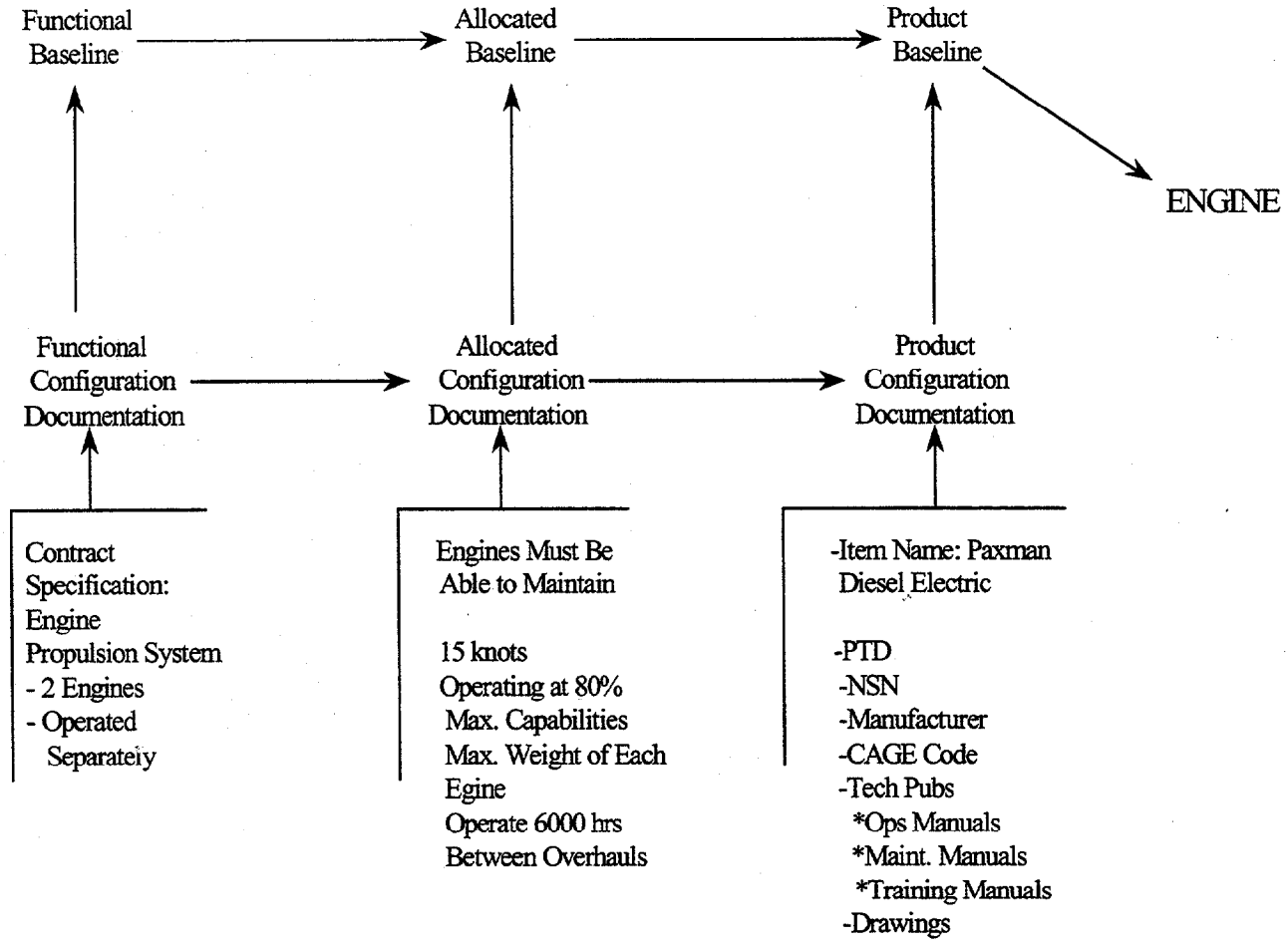

Figure 3, Development of Configuration Baselines

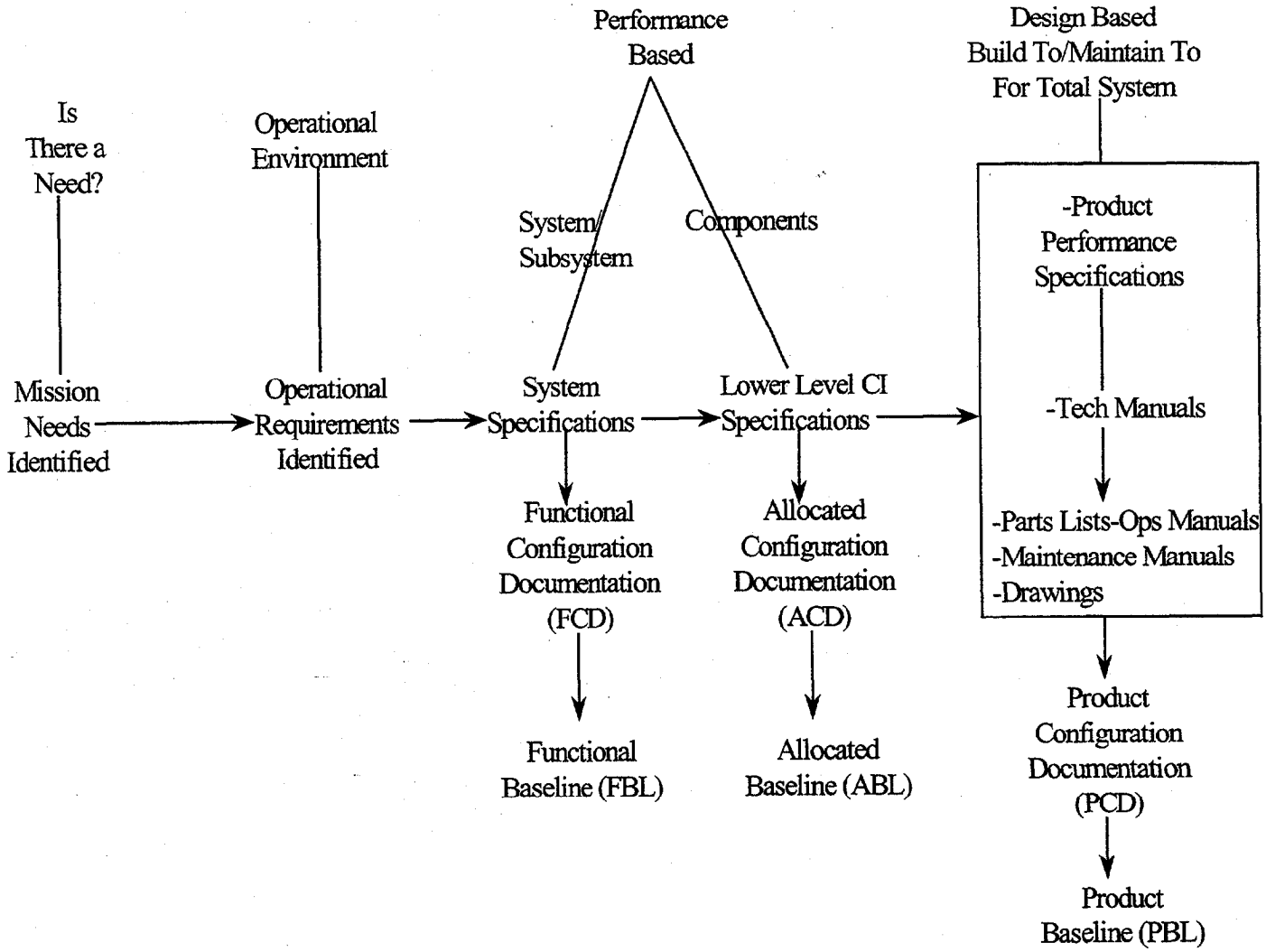

Figure 4, Development of Configuration Documentation

(2) **Use**. The FBL defines the System's technical, mission, operational (including availability) functional requirements, interoperability and interface characteristics, and identifies design constraints.

(a) **Functional Characteristics**. Functional characteristics are defined in terms of:

1. Quantitative performance, e.g., capable of maintaining a speed of 15 knots at 80% maximum engine capacity,

2. Operating and logistics parameters, e.g., level of repair (at the organization level) and on-board sparing availability, and

3. All performance parameters, e.g., range, speed, reliability, maintainability and safety.

(b) **Interoperability and Interface Characteristics**. Interoperability and interface documentation should include information on items being separately developed or which are currently in the Coast Guard or federal supply inventory, but with which a CI will have a common interface or be integrated. An example would be a drawing depicting the connections between a closed circuit television and a radar system.

(c) **Design Constraints**. Design constraints may include operational envelope dimensions and integrated logistics support policies. Minimum crew size is also considered as a design constraint.

(3) **Establishment**. Two Coast Guard internal reviews, a System Requirements Review (SRR) and a System Design Review (SDR) are normally held prior to establishment of the FBL. During these reviews the preliminary FCD (consisting of project requirements documents and the preliminary System/System segment specification) is reviewed. Normally these reviews occur after the overall System requirements are defined. The formal FBL is established at the time the FCD is approved by the Coast Guard and/or implemented under a contract. Formal configuration control begins at this time.

h. **Allocated Baseline**. The ABL is defined by the approved ACD, including any Coast Guard approved changes to the ACD. The ABL formally breaks out the functional requirements identified in the FCD into more detailed functional requirements for the System and major subsystems. The ABL represents performance-oriented requirements for lower level CIs.

(1) **Form**. The ABL is comprised of a series of Hardware Specifications and Software Specifications for lower level CIs. These may be supplemented by engineering drawings, tests required to demonstrate achievement of each contractually specified functional characteristic, lists of Government Furnished Equipment (GFE) and Government Furnished Information (GFI), and all applicable CDRLs as necessary to specify the physical characteristics of a CI.

(2) **Use**. The requirements in the specification are the basis for the contractor's selection of CIs; the quality assurance provisions in the specification form the framework for the qualification-testing program for the CIs. During actual development and design of the System, the specification and related documents in the ABL are used to:

(a) Identify, define and develop CIs that are part of a higher level CI.

(b) Define the functional and physical interface characteristics between the lower level CI and its next higher level CI.

(c) Identify the necessary functional and physical interface requirements of the CI with associated CIs existing at the same and lower level of the Work Breakdown Structure (WBS).

(d) Establish tests required to demonstrate and validate that the CIs perform the functional requirements.

(e) Establish design restraints, if any, such as component standardization, use of inventory items, and integrated logistic support requirements.

(3) **Establishment**. Whenever possible, the ABL should be formally established with the award of the engineering or operational development contract. Normally, the ABLs for HWCIs are established at the PDR early in the development stage, but no later than the CDR. ABLs for CSCIs are established during or immediately following the SSRs.

i. **Product Baseline**. The PBL is defined by the approved PCD, including any Coast Guard approved changes to the PCD. The PCD documents the requirements for the production or manufacturing of HWCIs and the coding of CSCIs.

(1) **Form**. The PBL represents the approved "build to" specifications and addresses the form, fit and function of a CI, and its associated ILS requirements. The PBL includes production drawings, associated lists and related data; PTD, operating and maintenance technical manuals, validation and verification documentation; and the contractor's logistic and configuration data files for the entire System.

(2) **Use**. The PBL is used to describe all the necessary functional and physical requirements at a level of detail sufficient to begin production, implement operations, identify the complete ILS requirements, and identify reprocurement strategies for all future life cycle phases of the System.

(3) **Establishment**. Approval of the PCD and establishment of the PBL should be completed during or shortly after completion of the Physical Configuration Audit (PCA) when the design is finalized. In addition to the PCA, a Preliminary Design Review (PDR), Critical Design Review (CDR), Product Readiness Review (PRR) and when required a Formal Qualification Review (FQR) must be successfully completed prior to establishing the PBL.

2. **Configuration Item (CI) Selection**. Identification of CIs is done by incrementally establishing and maintaining a definitive basis. This definitive basis is the baseline and the supporting documented technical description (configuration documentation) which collectively define a System and all the CIs comprising the System. Selecting CIs is an ongoing process until all of the CIs are identified and the PBL is established. CI selection should result in a logically related hierarchical top-down structure(s) of a System or System segments and lower level CIs.

a. **CI Selection Process**. Selecting CIs is accomplished by decomposing or breaking out a System into numerous lower level CIs. The CI selection process continues until all items determined to have an end-use function are determined to be:

(1) Maintenance worthy are identified as CIs; or

(2) Engineering or logistics critical, down to the lowest logical element, sometimes known as the Lowest/Line Replaceable Unit (LRU) is identified as a CI. For replacement purposes, a faulty LRU is replaced in its entirety, therefore, there is no need to identify its parts.

(a) For hardware, a LRU is a unit of production which cannot be further subdivided.

(b) For software the version is normally considered a LRU.

(c) A piece of firmware with an embedded software version is considered a LRU.

b. **System Architecture**. System architecture refers to the identification of the internal structure and relationship of a System's components. Figure 5 illustrates a System architecture break out.

(1) **Work Breakdown Structure (WBS)**. System architecture is based on and uses the WBS. When applied, the WBS divides a System into logical parts. System architecture identifies functional and relationship requirements. All CIs should relate back to the WBS which is described in reference

(2) **Establishment**. System architecture begins with identification of the total System (e.g., a cutter or aircraft). Next, the major functional subsystems for the System are identified (power source, communications system, navigation system, etc.). This establishes the internal structure of a System. Then the relationships of the System requirements and the major subsystem requirements are identified (the computer system must integrate with the communications and radar systems which use electrical power from the generator). These requirements are decomposed into lower level functional requirements. As the WBS of a System is further developed and lower level systems, subsystems, components and elements are identified; lower level CIs are also identified.

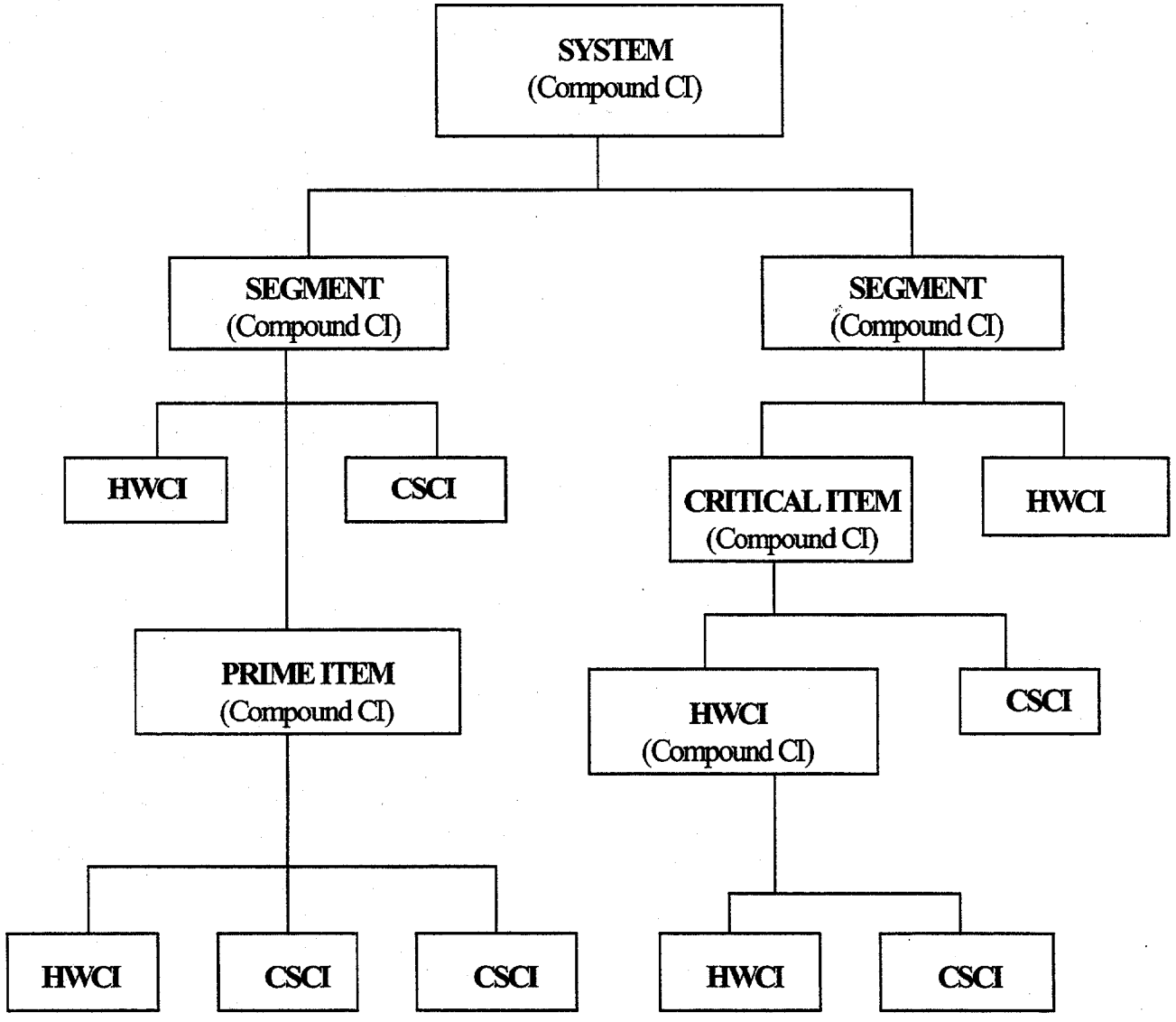

Figure 5, System Architecture

(3) **Guidelines**. The following functional requirements may be used as guidelines for developing a system architecture and identifying CIs:

(a) **System/System Segment**. System requirements are defined in terms of the overall mission and performance requirements of the system. For this reason, the System should be designated as the top level CI composed of lower level CIs. Even a moderately large System, e.g., a ship's propulsion control system, is too complex to develop, support or reprocure at this single high level. A large System, particularly when separate acquisition contracts are involved, is normally decomposed into segments. System or System Segment requirements are initially stated in the Mission Need Statement (MNS) and the Operational Requirements Document (ORD). These requirements are used as the basis for the System or System Segment Specification. The System or System Segment Specification(s) is the primary document in the FCD.

(b) **Prime Item**. A prime item is normally a complex assembly of components, found in the higher levels of the system architecture. A Prime Item Specification defining performance requirements is the primary document in the ACD when the prime item is part of a larger System. Product specifications are also used to describe a prime item. A Prime Item Specification may be included in the FCD for a single CI development project (e.g., radar system or diesel engine radar system or diesel engine). The following criteria is useful for identifying prime items:

1. Components within an item will be separately accepted by the project office.

2. The item will be provisioned (with possible multiple suppliers).

3. Technical manuals or other material on operation and maintenance of the item will be required.

4. The item will undergo qualification testing rather than random sampling during production.

(c) **Software Item**. Computer Software Configuration Items (CSCIs) may vary in complexity from the very complex, (software that creates the visual display in a simulator containing thousands of lines of code) to the very simple (test software for a circuit card that has very few lines of code). In most cases firmware should be treated as software. Refer to reference (e) for more detailed guidance on identifying CSCIs. Normally, CSCIs have some or all of the following characteristics:

1. A separate specification needed to document the distinct functional capabilities and complexity of the software item.

2. Coast Guard (Government) funds rather than contractor or private funds are used for the development or modification of the software item for use with a higher level system.

3. The CSCI will be supported on different hardware and/or at different locations than other CSCIs (system or software items).

(d) **Critical Item**. Critical items are less complex than prime items and are components of prime items. During development of the System, critical items are first described in Requirements Specifications in the ABL. During manufacturing and production of the System, critical items are described by Product Specifications in the PBL. An item may be either engineering (functionally significant) or logistics critical.

1. **Engineering Critical Item**. An item is engineering critical when any of the following criteria are met:

   a. The technical complexity of the item requires an individual specification.

b. Reliability of the item is critical to the overall function of the System or higher level prime item(s).

c. Safety, health or security concerns exist with respect to the design, manufacturing, fielding, and/or disposal of the item.

d. Separate testing and evaluation of the item for functional and physical suitability in its required application is necessary to adequately evaluate the item or higher level item.

2. **Logistics Critical Item**. An item is logistics critical when any of the following criteria are met:

a. An item unique maintenance plan, including a Preventive Maintenance System (PMS), is required to preserve the item in a condition of good repair or efficiency.

b. Repair parts will be provisioned for the item.

c. The item will be reproduced by or reprocured from multiple sources. If there are numerous suppliers, tighter control of the interfaces between various CIs is required.

d. Less than a minimum support level for any of the ten Coast Guard recognized ILS elements identified in enclosure (2) of reference (c) would adversely affect the acquisition project schedule or the operational capability of the System, subsystem, part or component.

e. Different activities have been identified to maintain various subsystems, parts or components of the System. Both the System, subsystem and the parts or components should be designated as separate CIs.

(e) **Non-Complex Items**. Non-complex items are relatively simple design items. Examples of non-complex items are special tools, work stands, fixtures, and brackets. Non-complex items normally can be defined adequately during the development phase by a sketch and during production by a drawing or set of drawings. If a specific detailed verification procedure is required under the contract, and a drawing will not sufficiently describe a non-complex item, Performance and Product Specifications are used. Non-complex items are normally not identified as CIs. Non-complex items must meet some or all of the following criteria:

1. During development of the System or CI, the item can be shown to be suitable for its intended application by random inspection or demonstration.

2. Acceptance testing to verify performance is not required.

3. Acceptance can be based on verification that the item, as fabricated, conforms to the drawings.

4. The end product is not software (or firmware).

(4) **Decision Process**. The process of breaking out a large complex System into a logical and integrated arrangement of pieces is primarily a system engineering and design engineering function. The selection is based on the specification requirements as stated in the contract. The contractor concurs with or recommends changes to the specification requirements. Once agreement is reached on the requirements, the contractor selects and recommends potential CIs to the PM/PO. The PM/PO provides final direction on which specifications will be used, final approval of selected CIs and the manner in which the CIs are represented in the System architecture. Once CIs are approved by the PM/PO, CIs are placed under configuration control. Representatives from project management, engineering, ILS, CM, safety and other disciplines within the project matrix organization should actively participate and be consulted with during the CI selection process.

c. **General Guidelines For CI Selection**. CI selection separates the System into individually identified components for the purpose of managing their design, development and later support. The following paragraphs address considerations that should be made by all personnel involved in the selection process:

(1) **Level of Coast Guard Control**.

(a) During acquisition, this is the level at which the PM/PO specifies, contracts for, and accepts individual components of a System. This level should provide the PM/PO with the ability to effectively manage the development of the System.

(b) During the sustainment or deployment life-cycle phase this is the level at which the support activities organize and allocate maintenance tasks down to the LRU.

(c) The level of Coast Guard control can also be impacted by the DOD or Other Government Agencies (OGAs) management or CM responsibilities for an item.

(2) **Cost**. Consider the balance between the requirement for complete and detailed identification of the functional and physical characteristics of a System and the CIs comprising the System versus the cost of maintaining the associated technical configuration documents.

(3) **Engineering Design**. Engineering and technical requirements should be agreed upon early in the acquisition process. Changing system architecture or reallocating functions after a baseline is established and approved, should be avoided.

(4) **New or Modified Design**. Normally, new or modified design items are often unproven. More control is required than for mature design items.

(5) **CI Independence**. A high degree of independence should be reflected in the selection of lower level CIs. This means that each lower level CI must be a logical entity and have its own end-use function. For example, a communications system contains a power source that provides electricity to an amplifier. Although functionally related as parts of the

communication system, both the power source and the amplifier would be separate CIs. The end-use function of the power source is to provide electricity to the amplifier. The end-use function of the amplifier is to increase the audio level of a signal. Components of the lowest level CI should be functionally related.

(6) **Support Functions**. Mission, test, training and maintenance functions should not be mixed within one CI. Combining unrelated functions into a single CI may delay testing, or increase the difficulty of testing critical capabilities. For example, operational software should always be separated from support software.

(7) **Management Visibility**. Designating a critical or a high technical risk item as a CI adds visibility that can help ensure that requirements are met as specified, schedules are maintained, and support costs reduced.

(8) **Integrated Logistics Support (ILS)**. Selection of CIs affects the ILS effort throughout the life of a System. All follow-on development acquisitions, modifications, retrofits, and new interface requirements for hardware and software components are based on the selection of CIs.

(9) **Common Components**. For prime items or subsystems that include common components or support equipment, CIs should be designated down to the assembly level that is common to the various prime items or subsystems. On the other hand, a unique component required to satisfy requirements peculiar to only one of many similar subsystems should also be identified as a separate CI.

(10) **Subassembly Characteristics**. All subassemblies of a CI should have a common function, common installation and common deployment requirements. Subassemblies of a CI should not require separate testing. If a subassembly does not fit this description, it should be part of another subassembly or a separate CI.

(11) **Criticality**. Items, parts or components that implement critical capabilities, e.g., security, protection, collision avoidance, or human safety, should be designated as separate CIs. Designation should be done only to the extent necessary to establish and maintain the required level of control and verification of an item's functional capabilities.

(12) **Financial Impact**. If failure or malfunction of an item would result in a significant cost then that item should be selected as a CI.

(13) **Non-Developmental Items (NDIs), Off-The-Shelf (OTS) Items and Commercial-Off-The-Shelf (COTS) Items**. An NDI, OTS or COTS privately developed item that is used in direct support of an operational or mission requirement shall be designated as a CI. A modified NDI/OTS shall be identified as a CI. Determining factors include:

(a) The criticality of the modified CI to the operations or mission of the System,

(b) The extent of the modification, and

(c) The extent of ownership of data rights on technical documentation that is required and is available to support the item during operations.

(14) **Consumable Items**. Consumable items are not normally designated as CIs, although some consumable items may be determined to be maintenance worthy or critical. Consumable items determined to be maintenance worthy or engineering or logistics critical shall be designated as CIs. For example, an engine is attached to a platform by a mounting bolt. The mounting bolt is a consumable item that when worn is removed and thrown away. But the mounting bolt may be critical to the overall function of the engine or have an end-use function. If the bolt's size, strength, thread type and finish are critical to the performance of the engine, e.g., the mounting bolt must not vibrate loose while the engine is operating, the bolt is engineering critical. If when properly installed, the mounting bolt prevents the engine from vibrating, the mounting bolt satisfies an end use function. In either scenario, the bolt is a CI because the bolt is critical to the performance of the engine and satisfies an end-use function.

3. **Configuration Identifiers**. Configuration identification includes assigning numerical identifiers to CIs and their component parts and associated configuration documentation. Identification numbers provide an easy means of referencing various elements of a System and its related documentation without having to use lengthy strings of words like the name of a System, subsystem,

part, assembly or component; title of a specification, manual or drawing. CI identification numbers interact with other identifiers and markers such as nomenclature, Government/Coast Guard serial numbers, including lot and class numbers; nameplates, markings, reference designations, parts numbers and lists. CI identification numbers also interact with software version and revision numbers resulting from configuration changes, and identification or re-identification of associated drawings and specifications.

a. **CI Numbers.** A CI number is a number assigned to an item designated for CM. All technical and contractual requirements or references should relate back to this number. Use of a coherent identification system is essential to the overall goal of "knowing what we have" and common reference points from which all involved with a project can work from. Common-sense and tailoring to the requirements of the project should guide the development of the numbering scheme. Guidelines for selecting a CI numbering scheme include:

(1) The numbering scheme should be simple, concise and clear. This provides for easier retention, identification, recording, and relating to other assigned numbering schemes, e.g., drawing and specification numbers.

(2) Use a standard numbering scheme. This ensures that all individuals involved with the project are referencing the same CI.

(3) Each distinct item designated as a CI should be assigned a unique number which is never assigned to another item.

(4) A part number should not be used as a CI number. CI numbers should never change. A part number can be changed to reflect configuration changes.

(5) A Logistic Control Number (LCN) should not be used as a CI number. A LCN can reflect two items which are functionally related or operate in the same manner, but are physically different. Two items that are physically different, i.e., different form and possibly different fit, must be two different CIs.

(6) A numbering scheme should be able to accommodate new types of a CI and its associated configuration documentation without revising the numbering scheme.

(7) Once assigned, a CI number should never be changed.

(8) CI numbers should be issued from a central control point. This avoids assigning different numbers to identify the same CI and the same number to different CIs.

b. **Numbering Schemes**. The exact numbering schemes established for a project will depend on the project specific contractual requirements. Once CIs and their configuration documentation are selected, the next task is to assign a numbering scheme. Numbering schemes can take numerous shapes and lengths and vary drastically from one contractor to another. The scheme can be as simple as 1, 2, 3, or as complicated as a 50 character alphanumeric code where each character describes an aspect of the item.

c. **CM Involvement**. The Project CMan and data control personnel are responsible for assigning and controlling identification numbers for all CIs. If numbers are assigned by the PM/PO, the Project CMan is responsible for ensuring that these numbers are used. This includes ensuring that no numbers are changed without reason and that no two different CIs have the same identification numbers.

C. **Configuration Control**. Strict configuration change control measures during the early development of a CI, can ensure adequate control of the developing and later the fielded product. During acquisition, configuration control ensures that the integrity of the configuration of a CI, and its supporting configuration documentation is maintained at all times. As a general rule, formal configuration control procedures for a CI and associated configuration documentation is implemented when the FBL is established.

1. **Configuration Change Proposals**. The statement "configuration change" signifies that the configuration of the functional or physical characteristics of a CI (hardware, software or firmware) has been, or will be changed through an established configuration control process. Reference (h) contains submittal documents/forms, and guidance on the format and content of configuration change proposals.

a. **Criteria**. Configuration change proposals should be beneficial and necessary to the project. Criteria for determining whether a proposed configuration change is beneficial and necessary include, but are not limited to:

(1) Correcting known or observed deficiencies in the System design in order to meet stated requirements.

(2) Adding or modifying interface or interoperability requirements.

(3) Making a significant change in the effectiveness of the System's operational or logistics support capabilities.

(4) Providing substantial life cycle cost savings.

(5) Preventing slippage in an already approved project production schedule.

b. **Contents**. A proposed configuration change should contain detailed description that can be readily incorporated into the existing CI and existing configuration documentation, and identify a strategy to purchase new assets. Supporting documentation for a proposed configuration change should completely describe and justify all possible impacts the proposal could have. At a minimum, this documentation should address cost considerations, schedule impact, preliminary and detail design or technical risk, ILS impact or concerns, management or administrative concerns, operational capabilities, and interface changes.

c. **Proposal Submittal**. A proposed configuration change may be submitted as a/an:

(1) Engineering Change Proposal (ECP),

(2) Request For Deviation (RFD),

(3) Request For Waiver (RFW),

(4) Specification Change Notice (SCN), or

(5) Notice Of Revision (NOR).

d. **Engineering Change Proposal** (ECP). An ECP is a permanent change to a CI and its configuration documentation. Once the FBL is established, all proposed permanent changes to the baselined configuration shall be submitted as an ECP. The ECP must provide a complete descriptive analysis of the technical, interface, cost, schedule and logistics impacts of the proposed change. An approved ECP requires a corresponding revision of the documentation defining the affected CI. The PM/PO, Operational, Facility or System, contractor or user may originate an ECP. ECPs are either Class I or Class II.

(1) **Class I**.

(a) **Effectively**. A Class I ECP affects the FBL, ABL, the PBL, or the contractual factors identified in paragraph 3 below.

1. **FCD or ACD**. A change to any of the following requirements would place a CI outside the specified limits or tolerances detailed in the FCD or ACD:

   a. Performance.

   b. Reliability, maintainability or survivability.

   c. Weight, balance, or moment of inertia.

   d. Interface characteristics.

   e. Electromagnetic characteristics, or.

   f. Other technical requirements identified in the specifications.

2. **PCD**. A change to the PCD that also changes the FCD or ACD, or affects the contract is a Class I ECP. A Class I ECP to the PCD will affect or will result in one or more of the following:

   a. GFE or GFI.

   b. Safety or health.

   c. Compatibility or specified interoperability with interfacing CIs, support equipment or support software, spares, trainers or training devices, equipment or software.

   d. Configuration to the extent that retrofit of fielded CIs is required.

   e. Government accepted operation and maintenance manuals (for which adequate change or revision funding is not provided for under the existing production contract).

   f. Design, development and production of a new CI with a new

identification number because the CI currently being produced is not meeting operating envelope limits or performance requirements.

g. Interchangeability, substitutability, or replaceability of a production or fielded CI.

h. Source of the CI(s).

i. Skills, manning, training, biomedical factors or human-engineering factors.

3. **Contract**. A change to any of the following contractual factors is also considered a Class I ECP:

a. Cost to the Coast Guard including incentives and fees.

b. Guarantees or warranties.

c. Deliverables.

d. Scheduled contract milestones.

(b) **Priorities**. The priority of an ECP is used to determine the PM's/PO's response time for processing and implementing a decision on the ECP. The priority assigned to an ECP may be emergency, urgent or routine. The originator of a Class I ECP assigns a priority to each Class I ECP. The PM/PO may change the assigned priority. Description of priority assignments for Class I ECPs is as follows:

1. **Emergency**.

a. This priority is assigned to an ECP:

(1) Which would correct a "hazardous condition" that could result in either a fatal or serious injury, in extensive damage to equipment, potential environmental impact; or

(2) When national security is or could be compromised as a direct result of current operational characteristics of a CI. For example, national security could be compromised as a result of a malfunctioning command, control and communications system being used by a Port Security Unit (PSU) deployed to a war theater.

b. The affected CI should be discontinued from further, development or testing, and/or temporarily withdrawn from service.

c. Upon receiving an emergency Class I ECP, the PM/PO should process the ECP including submittal of the approval or disapproval decision via the contracting officer to the contractor within 24 hours.

2. **Urgent**.

a. This priority is assigned to a Class I ECP if there is a potential risk for a:

1. Compromise in mission effectiveness or a hazardous condition,

2. Schedule slippage, or

3. Cost increase.

b. Upon receipt by the PM/PO, processing time for an urgent Class I ECP including formal notification to the contractor should not exceed 30 days.

3. **Routine**.

a. This priority is assigned if none of the above conditions are met.

b. Once received by the PM/PO, the processing time for a routine priority Class I ECP is 90 days.

(c) **Types**.

1. There are two types of Class I ECPs:

   a. Preliminary

   b. Formal

2. Use of a preliminary ECP is optional. The PM may contractually require the contractor to submit a preliminary ECP prior to submitting a formal ECP.

3. Use of a preliminary Class I ECP enables the Coast Guard to review a proposed change prior to the availability of all necessary supporting information required for a formal ECP.

4. A preliminary ECP should be used only with a routine ECP. Emergency and urgent ECPs are often time critical. Use of a preliminary ECP for emergency or urgent category ECPs could create a safety or hazardous condition.

5. Information in an preliminary ECP should include:

   a. A summary of the proposed change,

   b. Any known impact on related areas, e.g., interfaces, and

   c. Alternative proposals, and justifications.

(d) **Approval Authority**. Only the project CCB chairman has authority to approve Class I ECPs.

(2) **Class II**.

(a) **Effectivity**. A Class II change can only affect the PBL and PCD, and then only if:

1. There are no functional or physical interchangeability impacts, and

2. The proposed change is within the scope of the contract.

(b) **Funding**. A maximum funding limit may be placed on Class II ECPs. This limit is determined by the PM/PO.

(c) **Examples**. Class II changes include editorial changes in documentation or hardware changes, such as material substitution.

(d) **Approval Authority**. For most projects, the cognizant Coast Guard Project Resident Office (PRO) can review a proposed Class II ECP and make the implementation decision without forwarding the ECP to the PM/PO. When the PRO non-concurs, the contractor can resubmit or request a review by the PM/PO. The PM/PO determination on classification and approval of the Class II change is final.

e. **Deviations and Waivers**.

(1) **Deviations**. The contractor submits a Request For Deviation (RFD) via the contracting officer to the PM/PO, prior to the actual manufacturing of a CI. The RFD is submitted because the contractor has identified a discrepancy between a CI and the technical requirements specified in the CI's configuration documentation. If the PM/PO approves the RFD, a formal written deviation is a authorization and issued by the PM/PO to the contractor. The deviation permits the developer to temporarily depart from a specification, drawing, or other requirement, and use a CI which does not conform to or is inaccurately described by its configuration documentation. A deviation may not be applied to software code listings.

(2) **Waivers**. A contractor uses a Request For Waiver (RFW) to obtain authorization from a PM/PO via the contracting officer to deliver a nonconforming CI. A RFW is required when due to an error during production, a CI does not meet the contractual requirements or the description in the CI's configuration documentation, but is suitable for use "as is" or after repair. Note that the repair method must be approved by the Coast Guard contracting officer. A waiver is a formal written authorization issued by the contracting officer to the contractor. The waiver states that the Coast Guard will accept a CI that does not conform with the configuration documentation or contract requirements.

(3) **Submittal**. A contractor may submit a RFD/RFW in letter form, contractor designed form or on DD Form 1694, Request For Deviation/Waiver (RFD/RFW). Submittal form and procedures should be agreed upon with the PM/PO having the ultimate decision.

(4) **Temporary Request**. An RFD/RFW proposes a temporary departure or relief from mandatory specification requirements for:

(a) A specific number of production units of a CI, or

(b) A specified period of time.

(5) **ECP Requirement**. A deviation or waiver may only be a "temporary" change. A permanent change requires submittal of an ECP. An ECP must be used if:

(a) The deviation or waiver would require:

1. A permanent revision to the applicable specification, drawing or other contractual requirement, or

2. A permanent configuration change to the CI.

(b) The deviation or waiver is recurring or is an extension of a previously approved deviation. In general:

1. A deviation or waiver should occur no more than twice, and

2. The effectivity of a deviation or waiver should normally not include the entire remaining number of deliverable CIs under contract.

(6) **Classification**. Deviations and waivers are classified as critical, major or minor. Classification depends on the type of requirement in the contract. For example, a RFD/RFW against a major requirement is classified as major. Requirements may be project specific or may reflect the guidelines provided in reference (h), which describes the criteria for classifying requirements.

(a) Critical and major RFD/RFW are submitted in the same manner as a Class I ECP.

(b) Unless, the PM/PO has determined otherwise, the Coast Guard activity authorized to approve a Class II ECP is normally authorized to approve a minor RFD/RFW.

(c) Processing time for a major deviation or waiver is 30 days. Processing time for a minor deviation or waiver is 90 days.

(7) **Critical**. Deviations and waivers are classified as critical when the RFD/RFW is intended to prevent an unsafe or hazardous condition for individuals using or maintaining a CI. Unless extenuating or unusual circumstances exist, critical deviations or waivers shall not to be authorized. A Class I, emergency ECP must be used:

(a) In situations where judgment and experience indicate that use or maintenance of the defective or nonconforming CI is likely to result in unsafe or hazardous conditions.

(b) If left uncorrected, use or maintenance of the defective or nonconforming CI would jeopardize the intended tactical function or mission of a major end item such as a vessel or aircraft, or

(c) When there is a flaw in the configuration documentation concerning safety requirements specified in the contract.

(8) **Major**. A major RFD/RFW is used in situations other than critical, when use of the defective or nonconforming CI is likely to result in failure, or to reduce significantly the use of the CI. A major RFD/RFW is required when any of the following is an issue:

(a) Health.

(b) Performance.

(c) Service operation.

(d) Logistic interoperability.

(e) Interchangeability, reliability, survivability, or maintenance (e.g., repair parts, operation or maintenance procedures, or compatibility with trainers or test sets).

(f) Weight and size.

(g) Appearance (when a factor).

(h) The defective CI does not confirm with the configuration documentation defining the major requirements for the CI.

(i) Configuration documentation related to any of the above issues is determined to be flawed.

(9) **Minor**. A RFD/RFW is classified as minor when the deviation or waiver does not involve any of the factors related to critical or major deviations/waivers; or, the departure is required as a result of a minor defect in the configuration documentation for the CI. A defect is considered minor in situations where:

(a) The defect is not likely to reduce the capability of the CI in fulfilling its end use function, or

(b) The defective CI is nonconforming with a requirement having little bearing on the effective use or operation of the CI.

f. **Specification Change Notice (SCN)**. A SCN is submitted with a Class I ECP, when approval of the ECP will require an update to a specification that is part of a CI's configuration documentation; and, the contractor originating the ECP is the custodian of the master files of the configuration documentation. The SCN should be submitted as an enclosure to the ECP, and identify the changes, additions, or deletions to the contents of the current specification. A SCN is not required to implement a change to engineering drawings. Processing time for an ECP and accompanying SCN are the same.

g. **Notice of Revision (NOR).** A NOR is required when the originator of a Class I ECP does not maintain the master files of the configuration documentation. The contractor is not permitted to revise the configuration documentation, specifically drawings, to reflect a redesign, until the related Class I ECP is approved, and the PM/PO directs the activity maintaining the configuration documentation (normally the contractor) to revise the configuration documentation. A NOR should be issued concurrently with or shortly after CCB approval of an ECP.

2. **Controlling Configuration Change.** The configuration change control process shall be tailored to meet specific project requirements.

a. **Requirement.** A configuration change proposal shall be processed through the project's established configuration control process for:

(1) Any configuration change to the current approved configuration documentation, i.e., the FCD, ACD or PCD for a CI.

(2) Any configuration change affecting the form, fit or function of a CI.

(3) Any configuration change affecting logistics supportability, for a CI, down to the LRU.

(4) Any configuration change that is outside of the scope of the current contract.

NOTE: This requirement is valid throughout the sustainment and disposal life cycles of the System.

b. **Implementation.** The change control process implemented by a project office shall contain, at a minimum, the following common elements:

(1) **Configuration Control Board (CCB).** A designated and chartered CCB. The CCB is established by Commandant (G-CCS) charter after the initial project requirements documents are approved. The PM/PO is responsible for ensuring that all configuration changes are reviewed and controlled by the CCB, and that the CCB utilizes an established and well-defined change control process.

(a) The PM/PO may delegate limited configuration change control authority to lower levels in the project or logistics support matrix. Such lower level CCBs can be established to review, recommend, or

make decisions regarding proposed configuration changes.

(b) Normally, CCB membership should be comprised of a chairman, Project CMan, voting members and ad hoc nonvoting members.

1. **Chairman**. CCB Chairman for an acquisition project is the PM/PO. Responsibilities of the Chairman include:

   a. The final decision on all proposed configuration changes brought before the CCB.

   b. Ensuring that all CCB members have an opportunity to address each proposed change.

   c. Calling formal meetings to fulfill project requirements.

   d. Managing all CCB change control procedures, activities and the timely processing of all proposed configuration changes.

2. **Project CMan**. The Project CMan provides guidance to other CCB members concerning adherence to current Coast Guard CM policy. Other responsibilities include providing administrative services such as scheduling meetings, publishing the CCB agenda, recording and distributing minutes of each CCB meeting, recording CCB decisions, and tracking assigned action items.

3. **CCB Voting Members**. Activities or offices represented as voting members of a CCB should be identified in the CCB charter as permanent CCB members. Alternate members should also be identified. Voting members on a CCB should be experienced, qualified representatives from CM, systems engineering, production and acquisition management, logistics support, contracts, safety and operations. Voting members are responsible for:

a. Reviewing all proposed changes brought before the CCB with regards to their specific area of expertise and functional area of responsibility within the project matrix.

b. Providing information relating to their area of expertise or functional area to the CCB Chairman.

4. **CCB Non-Voting Members**. Non-voting members participate in CCBs on an ad hoc basis when expert opinion or insight is required to provide a complete picture of the proposed configuration change and resulting impact. For example, expert advisors should participate in the review of a proposed configuration change affecting interfaces, hazardous materials, ecology or the environment.

5. **Outside Sources**. Depending on the type of change being proposed, a CCB may request support and/or advice from other sources such as lower level CCBs, ICWGs, technical sources, OGAs, and contractors. These representatives attend the CCB to provide additional information and insight into a particular concern.

(2) **Process**. A defined and adhered to process for recognizing the need for a change. This process should:

(a) Ensure that:

1. All changes are processed in a timely manner.

2. Changes offering significant benefits are approved for implementation.

3. Unnecessary or incomplete proposals are identified and returned to the originator with a formal explanation of why the proposal was rejected early in the change control process.

(b) (As an option) provide for, review and approval of preliminary change documents

prior to submittal of formal change documents as a cost saving mechanism.

(3) **Identification**. Require identification and documentation of all proposed changes.

(4) **Proposal Distribution**. Distribution of a proposed change for review and assessment of the impact(s) of the change. Proposed configuration changes should be distributed to all voting and ad hoc nonvoting members.

(5) **Analysis**. Analysis and documentation of the change proposal. Impact analysis should be conducted and considered prior to the implementation decision. Analysis and documentation should include:

(a) Cost benefit analysis and risk assessment.

(b) Review of all interfaces the CI has with other parts of the System, subsystems or facilities.

(c) Identification of potential impact(s) on the System, technical performance, compatibility, availability, reliability and ILS elements.

(6) **Approval/Disapproval Alternatives**. The option of not proceeding with the proposed change.

(7) **CCB Decisions**. Final determination by the CCB based on review of the total project or System wide impact of the proposed change. Decisions affecting the configuration of a CI should be well documented with all considerations presented and considered before the implementation decision is made.

(8) **Distribution of CCB Decisions**. Require documentation and promulgation of the final decision.

(9) **Contract Modification**. The contractor shall not be authorized to implement an approved change without first receiving official, contractual authorization from the project contracting officer.

(10) **Incorporation of Change**. Implementation and verification of the completion of the change. This provides for timely testing and incorporation of approved changes.

3. **Interface Control**. Interface control involves identifying, documenting, and controlling all functional and physical characteristics of the interfaces between two or more CIs which are provided by one or more organizations. Interface control is conducted by an ICWG using ICDs.

   a. **Requirement**. An interface change may have a widespread effect. For this reason interface requirements and documents shall be placed under configuration control as the appropriate baseline is established.

      (1) Early in the project, critical high-level interface requirements should be specified in the System/System Segment Specification(s) as part of the FBL.

      (2) During development of the System, the prime contractor is responsible for identifying, defining, controlling, and integrating all lower-level, i.e., detailed design and interfaces. These requirements are specified in a Interface Requirements Specification (IRS). The IRS becomes part of the ABL.

      (3) Except for Systems having intricate interfaces, the PM/PO should delay formal Coast Guard control of the lower-level interfaces until the PBL is established. This permits design flexibility. Once the PBL is established, the project CCB controls the configuration of identified physical and functional interfaces of the System, lower level systems, subsystems, equipment, support equipment, computer software, and facilities.

   b. **Example**. The Coast Guard has determined the need for a new vessel. Interface control will be required for this acquisition because:

      (1) The vessel will have a navigation system.

      (2) The navigation system will include:

         (a) A radar system,

         (b) The Global Positioning System (GPS), and

         (c) Various other electrical systems, subsystems and components.

(3) The prime contractor for the vessel will provide the radar system as Contractor Furnished Equipment (CFE).

(4) The prime contractor will purchase the radar system from a subcontractor or vendor.

(5) The Coast Guard will provide the GPS as GFE.

(6) The GPS is Navy supported.

(7) Interface control will ensure compatibility and interconnectivity between the GPS equipment and the radar, and any other co-functioning subsystems or items in the navigation system.

c. **Interface Control Working Group (ICWG).** An ICWG shall be established and ICDs shall be used for acquisition projects for large Systems containing many major systems produced by various organizations. Although interface control is a systems engineering function, CM personnel should be knowledgeable of the interface control process.

(1) **Function.** The ICWG serves as the official communications link among the participants and provides them with the means to:

(a) Establish and document agreements on technical interfaces among CIs.

(b) Resolve any interface problems that arise.

(c) Coordinate all ECPs to CIs which may impact interface requirements.

(2) **Membership.** ICWG membership should include at least one member from each organization involved with the design, development and/or integration into the System of any CI having interfaces. Members must have approval authority to commit their respective organizations to technical interface agreements. The chairperson of the ICWG should either be from the Coast Guard project office or the prime contractor. A roster of the members and their alternates should be officially recorded in a contractual letter or order.

d. **Interface Control Documents (ICDs).** ICDs are "design control documents." ICDs are usually drawings.

(1) **Use.** ICDs are used to define and control interface agreements established between the members of the ICWG. These agreements define

the lower-level interface requirements for the System and/or individual CIs. Using ICDs ensures that interface characteristics and requirements are delineated such that:

(a) Compatibility of all affected CIs is defined, established and maintained.

(b) Configuration control is established to prevent changes to interface requirements that would affect the compatibility of the CIs.

(c) Design decisions and changes are communicated to all participants.

(2) **Processing**. A draft ICD may be submitted by any ICWG member who has determined a need to establish or modify an interface. The draft ICD should be reviewed by the other members, with comments returned to the chairperson. The draft ICD should then be discussed at the next ICWG meeting, and either approved or disapproved. A draft ICD affecting an interface not yet baselined may be approved by the ICWG. A draft ICD affecting an interface that has been baselined must be submitted to the PM/PO for review. The ICWG shall not approve a configuration change to a baselined interface or ICD. The proposed change, once approved by the ICWG must be submitted to the Coast Guard project office. If the PM/PO agrees with the draft ICD, the originator of the ICD is directed to submit an ECP to the project CCB.

D. **Configuration Status Accounting (CSA)**. CSA systems are used as a Management Information System (MIS) to record and report the information required to manage CIs. When utilized effectively, a CSA system can provide the basis for communicating CM data and information to all project office, contractor, support and user activities.

1. **Requirement**. A CSA system shall be implemented concurrent with the FBL being formally established. NOTE: The Contractor's CSA system shall be compatible with the Coast Guard data systems so that the CSA data can be transferred from the contractor's CSA system to the Coast Guard's CSA system.

2. **Implementation**. Requirements for a CSA system shall be clearly stated and identified in the project CMP and in the contract. The PM/PO shall provide guidance to the contractor via the contract on the following CSA support requirements:

a. **Software Tool(s)**. For example, GFI, OTS, NDI, Coast Guard selected but not provided; or, contractor recommended and government approved.

b. **Automation of the CSA System and Database**. An automated CSA system is required.

c. **Identification of Data and Data Elements**. Identify the data and data elements necessary to support CSA requirements, i.e., identify the required data elements used in the Coast Guard selected CSA system.

d. **CI Level of Indenture**. The level of indenture of the system architecture that the CSA system is to identify and provide reports on. For example, "identify all CIs down to the LRU."

e. **Data Collection Techniques**. For this the PM/PO must determine whether to contractually direct how the data will be collected or permit the contractor to chose the collection process.

f. **Reports**. The type of and frequency of CSA reports. At a minimum, reports should be required at or prior to each project milestone. Examples of such reports include:

(1) Platform, vessel or aircraft unique data including hull/serial number, Unit Identification Code (UIC), and status, e.g., under development or in production.

(2) System and equipment configuration data describing functional and physical identification characteristics.

(3) Logistics support data related to a System, subsystem, equipment or part.

(4) Alteration (configuration change) data on individual CIs including the status of the alteration.

(5) Narrative and general data containing technical information on individual CIs.

g. **Maintenance of the CSA System**. This includes how the CSA system will be updated, what data will be updated, by whom, how often, requirements for backup of the master file (on-site or off-site); and validation of the data.

h. **Transition of CSA Database**. Identify in the contract and the project CMP, how the data stored in the

contractor's CSA system/database will be transitioned from the contractor to the Coast Guard system/database. This includes the schedule and the degree of compatibility between the contractor's CSA system data elements and the Coast Guard's selected CSA system and/or CSA data elements.

3. **Contractor Responsibilities**. During System development and production, the prime or integrating contractor shall be responsible for collecting, recording, maintaining, and reporting contractually required information in the CSA system.

   a. The processes, responsibilities, organization and products, and all other CSA related contract deliverables shall be addressed in the contractor's CMP.

   b. The contractor's automated CSA system shall contain data elements that are compatible with the Coast Guard selected CSA system.

   c. The contractor shall be required to have an effective internal CSA system in place that will establish and maintain a record of the previous and currently approved configuration of every CI and supporting configuration documentation.

4. **CSA Database**. The CSA database shall contain configuration based data, including technical and logistics information that is recorded and maintained as a single integrated database. Typically, the CSA database should:

   a. Provide traceability of specifications and other configuration documentation.

   b. Track all released internal design documents associated with the CIs, including those not under Coast Guard or OGA control.

   c. Provide traceability of CI Identification Numbers (CIINs).

   d. Maintain a record of all proposed and approved change proposals to the configuration of a CI, its supporting configuration documentation and to the contract.

   e. Track the implementation of all approved changes to ensure that required actions are accomplished in a timely manner.

   f. Provide and maintain an accurate listing of the exact configuration of all system and subsystem components

for test configuration of each CI and each deliverable production unit CI.

5. **CSA Relationship To Other CM Elements**. CSA is closely integrated with each of the other CM elements in that CSA collects, documents, and reports information related to configuration identification, configuration change control, and configuration audits for each CI. For each CI produced and delivered to the Coast Guard, the contractor's CSA database should be able to provide a listing of the exact configuration of all system components which have been identified as CIs.

   a. **Configuration Identification**. The CSA system should include sufficient data to provide the following current and historical information:

      (1) For the System, identify each CI contained in the System WBS.

      (2) For each CI, identify every drawing, specification, and list comprising the CI's FBL, ABL, and PBL, and associated FCD, ACD and PCD.

      (3) For each CI, provide identifying data such as nomenclature, serial number, and part number.

   b. **Configuration Control**. The CSA system should be able to provide traceability of configuration changes throughout the configuration control process. The CSA database should include the following current and historical information pertaining to the configuration of each CI:

      (1) The current status of:

         (a) All proposed ECPs, RFDs, RFWs, SCNs and NORs,

         (b) Implementation status of all approved ECPs, RFDs, RFWs, SCNs and NORs, and

         (c) Final disposition of all proposed ECPs, RFDs, RFWs, SCNs and NORs.

      (2) All documentation on the final disposition of all ECPs, RFDs, RFWs, SCNs and NORs.

      (3) All formal impact analysis and cross references between the impact analysis and the related ECPs, RFDs, RFWs, SCNs and NORs.

      (4) Each engineering release document and cross reference between the engineering release

document with the approved baseline and configuration documentation.

(5) Schedule and completion dates for all field retrofits.

(6) Removal and replacement of components during maintenance actions.

(7) All contractual information as it relates to the System or to individual CIs, e.g., dates, cost and modifications.

c. **Configuration Audits**. The CSA database should include the following current and historical information pertaining to configuration audits performed or to be performed on each CI:

(1) Planned and actual dates for each configuration audit scheduled or conducted,

(2) The configuration of the CI and the configuration documentation that are the subject of each audit,

(3) Significant documents associated with each audit, including minutes and final reports, and

(4) All resulting configuration audit action items, including current status and final disposition.

E. **Configuration Audits**. Normally, audits are conducted concurrently with the PRRs after the PDRs and CDRs.

1. **Requirement**. A Functional Configuration Audit (FCA) and a Physical Configuration Audit (PCA) must be conducted for each unique CI or group of functionally related CIs. The PM/PO has the discretion to omit segments of these audits in cases where essentially identical subsystems were already successfully audited for other CIs. The PM/PO may hold periodic audits to monitor the progress of the contractor

2. **Use**. Audits are conducted to establish the PBL by:

a. Verifying that the performance of each CI(s) and the System meet the minimum contractual requirements, and

b. Ensuring that the approved "as built" configuration is accurately and adequately described by its configuration documentation.

3. **Functional Configuration Audit (FCA)**. The FCA is a formal organized presentation of engineering/test evidence. A FCA is conducted by the Project CMan and

chaired by the contractor CMan to verify the CIs' actual performance. Performance is verified for compliance with the hardware/software development and interface requirement specifications. The FCA should be conducted on a prototype or pre-production article. Although not recommended, a FCA may be conducted on a first production article, when neither a prototype nor a pre-production article is produced. Successful completion of the FCA is a prerequisite of the PCA.

a. The Project CMan provides the latest approved or conditionally approved documentation for the FCA. The CMan also:

(1) Establishes the FCA agenda.

(2) Identifies the FCA participants.

(3) Selects which CIs will be audited.

(4) Chairs or co-chairs the FCA with the contractor's CMan.

b. At a minimum, the PM/PO should review the following specific items during the FCA:

(1) Test plans, procedures, and the test results listed in the test reports. These items are reviewed to verify that the CI(s) performs per the requirements in the FCD and the ACD.

(2) Engineering drawings list, (including the revision level). This list should reflect the CI's detail design against which the test data is reviewed and verified.

(3) Drawings of provisioned spare parts. These drawings should be selectively sampled to assure essential manufacturing test data are furnished with the drawing.

4. **Physical Configuration Audit (PCA)**. The PM/PO conducts a PCA to ensure that each CI, "as built" agrees with its "design to" specifications, drawings, and documentation in the preliminary PCD. The current FCD and ACD are also reviewed. The PCA includes a detailed review of the engineering drawings, Product Specifications, listings, and other manufacturing data that will be used to produce the CIs. Normally, the PCA should be conducted on the first production item. Full scale production units, logistics and operational maintenance support, and reprocurement of spares are dependent on the results of the PCA. The PCA is presented by the contractor's or in-house developer's engineering, quality assurance or manufacturing organization. The PBL is approved and the PCD is established upon successful completion of the PCA.

a. As part of the planning for the PCA, the contractor should provide the PM/PO with information about the individual CIs and grouped CIs to be audited. This information should include: nomenclature, specification identification number, CI identifiers, serial numbers, top part/drawing numbers, and CSCI identification and version numbers.

b. The PM/PO should review the following during the PCA:

(1) The approved ACD, particularly the HWCI requirements specifications or CSCI software requirements, and when applicable IRS, and all approved changes, deviations and waivers to these specifications.

(2) Listing of all design differences between the physical configurations of the selected PCA unit(s) and those units used for the FCA. (Additional test data for differences between these configurations should be provided and reviewed to ensure that the changes do not decrease the functional capabilities of the production design.)

(3) Final draft version of the HWCI(s) or CSCI(s) product specification (the preliminary PCD).

(4) A comparison of the actual deliverable hardware against all associated approved drawings required under the product specifications.

(5) Manufacturing instruction sheets to ensure that they accurately reflect design details contained in the engineering drawings.

(6) The contractor's engineering release system and change control procedures to establish its effectiveness in controlling the release of engineering data.

(7) Acceptance tests results and procedures for adequacy and compliance with the product specification performance requirements.

(8) Final version of computer software operating and support documents for traceability to the final software code.

5. **Periodic Audits**. Periodic audits of the contractor's CM system may be conducted by the Project CMan. If deemed necessary, these audits must be specified in the contract. Periodic audits can ensure that the contractor's CM system is in compliance with the Project CMP, the approved contractor CMP, and any

other applicable contract requirements for the contractor's configuration database. Particular attention should be directed to the configuration data elements to ensure that the data elements are compatible with the Project CSA system.

6. **Audit Process**. The Project CMan is responsible for the overall audit process, including planning and scheduling the audits.

   a. **Audit Plan**. An audit plan must be included as a contractual deliverable. The plan should be tailored to the direction provided in reference (i). The contractor's audit plan must be submitted for approval to the PM/PO prior to actual conduct of the audit. The audit plan must identify or outline:

      (1) Type of audit, FCA, PCA, or periodic.

      (2) Scope and objective(s) of the audit, (CI, CSCI, subsystem, major system or System).

      (3) Actual conduct of the audits.

      (4) Minutes.

      (5) Schedule.

      (6) Data requirements.

      (7) Participants.

      (8) Responsibilities of the Coast Guard.

      (9) Responsibilities of the contractor.

      (10) Facilities required.

      (11) Audit materials, checklists or forms.

      (12) Any requirement for contractor support.

      (13) Content and format of the audit report.

      (14) Action item procedures (assignment and tracking) and forms.

      (15) Applicable standards (Coast Guard, DOD, OGA).

   b. **Audit Team**. The Project audit team should represent the engineering, quality assurance, logistics, CM and contracting offices.

Configuration audits for commercial acquisitions are co-chaired by the Project CMan and the contractor CMan. The Project CMan chairs the configuration audits for Coast Guard in-house development projects.

c. **Minutes**. Minutes should include: action items as well as identify personnel assigned the action, a description of discussed topics and decisions made, problems areas, a list of the items and or data presented, areas of agreement and disagreement, list of attendees, and side conferences. The minutes form the basis for the audit report.

d. **Audit Report**. An audit report addresses the audit findings, discrepancies and proposed resolutions. The contractor is responsible for submitting an audit report (as a contract deliverable) to the contracting officer who forwards the report on to the Project CMan. The Project CMan is responsible for submitting a documented assessment of the audit report, including a description of the audit criteria, items audited, findings, and recommended corrective action to the PM/PO. Findings and recommendations resulting from the audit(s) should be recorded and reviewed with the contractor. An audit is not complete until all action items are closed out by the PM/PO. The contractor should be notified in writing that an action item is closed out.

TECHNICAL REVIEWS

A. **Introduction**. This COMDTINST does not require that technical reviews be performed. This enclosure only describes technical reviews in view of the contributions of CM personnel to the technical review process. CM personnel are not responsible for conducting technical reviews. Technical reviews are the responsibility of the Coast Guard PM or PO and engineering staffs.

B. **Overview**. Technical reviews are used during the design and development phases of a project to document and evaluate the contractor's direction, development stage, process, and completeness in developing both preliminary and formal configuration documentation. Reference (i) contains detailed description of technical reviews and guidance on conducting technical reviews.

1. Technical reviews can range from very simple, straightforward affairs to complex and expensive operations involving dozens of people. More complex reviews may require advance preparation beginning months before the meeting and continuing for months after the reviews are completed.

2. During the development of a CI, technical reviews are used to ensure that all requirements pertaining to form, fit and function are met; that all performance and reliability requirements are met; and, that no design weakness exists that will compromise the performance, reliability or quality of an individual CI or the System.

3. Technical reviews may be internal Coast Guard only, or Coast Guard and contractor. Normally reviews held prior to contract award and formal establishment and approval of the ABL and ACD are held internally. Reviews held after contract award should include both the Coast Guard and the contractor. For in-house acquisition projects, e.g., TISCOM development of a new software System, all project matrix personnel should actively participate in all the technical reviews.

4. Specific objectives of technical reviews are to:

   a. Identify and clarify System and product requirements.

   b. Achieve the best design approach possible.

   c. Identify and confirm the final product design, i.e., the PBL.

   d. Avoid errors in design and production.

f. Ensure that a CI complies with the functional and physical requirements called out in the applicable specifications and drawings.

5. CM personnel, particularly the Project CMan should attend and actively participate in the technical reviews. The Project CMP should specify the role and responsibility of CM in the technical review process. Normally, CM responsibilities include, but are not limited to:

a. Assisting the PM/PO and engineering staff select the CIs to be reviewed during the technical reviews.

b. Providing the latest approved or conditionally approved, and accurate configuration documentation to the PM/PO. This documentation is the basis against which technical reviews are conducted.

c. Ensuring that the evolving technical description, (FCD, ACD, and PCD), of the System or individual CI(s) complies with the total project requirements as defined by the mission needs and operational requirements.

d. Incorporating all configuration changes resulting from technical reviews into the CIs and associated configuration documentation via formal change control processes.

e. Providing traceability of System and product requirements by entering all proposed and approved changes into and tracked in the CSA system.

C. **Types of Technical Reviews.**

1. **Systems Requirements Review (SRR).** The preliminary FBL should be established at the conclusion of a successful SRR. The preliminary FBL establishes the end-product or System as an "entity." A significant portion of the System's functional requirements must be established prior to a joint SRR.

a. The SRR is held immediately prior to, or at the time that project requirements are defined.

b. The PM/PO conducts a SRR to determine the adequacy or responsiveness of the project matrix organization. This includes review of initial project direction, identify the progress made in defining the technical requirements of the System, assess the adequacy of the documented functional requirements, and

implementing other related engineering management activities as necessary. During the SRR, preliminary allocations are made of technical, performance and mission requirements to functional areas. Design constraints and interfaces are documented and defined.

c. Although normally a Coast Guard internal review, a SRR can be jointly held with the contractor if a contract has already been awarded. A joint SRR is held to assess the contractor's efforts in defining the System requirements as stated in the contract.

2. **System Design Review (SDR)**. Successful completion of the SDR results in approval of the formal FCD and establishment of the FBL. Formal configuration control is started concurrently with establishment of the FBL. Data input to the CSA should also begin at this time.

a. The SDR is conducted after the System functional characteristics and, the System or top-level CIs have been identified (during the SRR) as the preliminary FBL.

b. An internal SDR is conducted to evaluate the System requirements, including operations, maintenance, system and subsystem level test and training hardware; computer software; facilities; personnel; preliminary logistic support considerations; and, system engineering management activities.

c. A joint SDR is conducted to evaluate the contractor's design effort in meeting System or System segment requirements.

3. **Software Specification Review (SSR)**. The preliminary ABL for the CSCIs, and at times the formal ABL for design development of the CSCIs should be established at the end of a successful SSR.

a. The SSR is held during the time between the SDR and the PDR. The SSR is a comparative review of the requirements of the CSCIs against the SRS, IRS, (and the ORD for major acquisitions).

b. Items reviewed during the SSR include a functional overview of the CSCIs, overall performance requirements, control flow and data flow between each of the software functions that comprise the CSCI, all interface requirements between testing CSCIs, and quality factors requirements, such as reliability, efficiency, usability, and testability.

4. **Preliminary Design Review (PDR)**. During PDR, the basic design/engineering approach for selected CIs or functionally related groups of CIs is evaluated. Each CI or group of CIs is reviewed on a technical, cost, logistics and schedule basis. Satisfactory review and verification of the CIs results in the approval of the ACD and establishment of the formal ABL for the System.

   a. The PDR should be conducted when the System design has been finalized or very early in the actual development of the System.

   b. The primary question answered during the PDR is "Does the design approach satisfy the System specification requirements?"

5. **Critical Design Review (CDR)**. The CDR is held to answer the question "Does the production design satisfy the requirements set out in the specifications?". If the answer is yes, then the contractor's product design is frozen and efforts are directed towards producing the end item, i.e., the System. At this point the preliminary PBL is established.

   a. The CDR should be held when the detailed design is about 90 percent complete with respect to formal engineering release for manufacturing and all interface control drawings have been finalized. This normally occurs when the development of the System is close to completion.

   b. Documents reviewed during the CDR include: draft Product, Process and Material Specifications, drawings, Software Detailed Design Document, Interface Design Documents, Data Base Design Documents, Software Test Description, Computer Resources Integrated Support Document, Software Programmer's Manual, Firmware Support Manual, Informal Test Descriptions/Test Procedures, and Software Development Files. These documents represent the preliminary PBL.

6. **Production Readiness Review (PRR)**. A PRR is a formal inspection of a System or product under development. PRRs are conducted while the System is being developed. Resulting information is used to update the FCD, ACD and establish the PBL.

   a. These reviews are conducted to determine whether the individual CIs and the System are ready for efficient and economical quantity production.

b. Areas reviewed include: current engineering activity, the status of production tooling/equipment, use of standardized or common parts, assessment of the contractor's production Quality Assurance (QA), production test procedures, preparing realistic production schedules, and subcontractor capabilities.

7. **Formal Qualification Review (FQR).** A FQR is used to verify that the actual performance of the CIs comprising the System is in accordance with the hardware development, software requirements and interface requirements specifications. Conducting a FQR is optional. If required and when feasible, the FQR should be combined with the FCA at the end of subsystem testing while the System is under development.

ACRONYM LIST

ABL	Allocated Baseline
ACD	Allocated Configuration Documentation
AMSDL	Acquisition Management Systems And Data Requirements Control List
CCB	Configuration Control Board
CDR	Critical Design Review
CDRL	Contract Data Requirements List
CE	Concept Exploration
CFE	Contractor Furnished Equipment
CI	Configuration Item
CIIN	Configuration Item Identification Number
CM	Configuration Management
CMan	Configuration Management Manager
CMP	Configuration Management Plan
COTS	Commercial Off-The-Shelf
CSA	Configuration Status Accounting
CSCI	Computer System Configuration Item
DID	Data Item Description
DOD	Department of Defense
ECONOP	Coast Guard Engineering Logistics Concept of Operations
ECP	Engineering Change Proposal
EILSP	Electronics Integrated Support Plan
FBL	Functional Baseline

FCA	Functional Configuration Audit
FCD	Functional Configuration Documentation
FQR	Formal Qualification Review
FSD	Full Scale Development
GFE	Government Furnished Equipment
GFI	Government Furnished Information
HWCI	Hardware Configuration Item
ICD	Interface Control Document
ICWG	Interface Control Working Group
ILS	Integrated Logistics Support
ILSP	Integrated Logistics Support Plan
IRS	Interface Requirements Specification
LCN	Logistic Control Number
LRU	Lowest/Line Replaceable Unit
MIS	Management Information System
MNS	Mission Need Statement
NDI	Non-Developmental Item
NOR	Notice Of Revision
OGA	Other Government Agency
ORD	Operational Requirements Document
OTS	Off-The-Shelf
PM	Project Manager
PBL	Product Baseline

PCA	Physical Configuration Audit
PCD	Product Configuration Documentation
PDR	Preliminary Design Review
PMS	Preventive Maintenance System
PO	Project Officer
PORD	Preliminary Operational Requirements Document
PRO	Project Resident Officer
PSU	Port Security Unit
QA	Quality Assurance
RFD	Request For Deviation
RFW	Request For Waiver
SCN	Specification Change Notice
SDF	Software Development Folder
SDL	Software Development Library
SDP	Software Development Plan
SDR	Software Design Review
SOW	Statement of Work
SRR	Systems Requirement Review
SRS	Software Requirements Specification
SSR	Software Specification Review
TEMP	Test and Evaluation Master Plan
UIC	Unit Identification Code
VDD	Version Description Document

WBS Work Breakdown Structure